Antimicrobial Stewardship Across the Spectrum of Health Care

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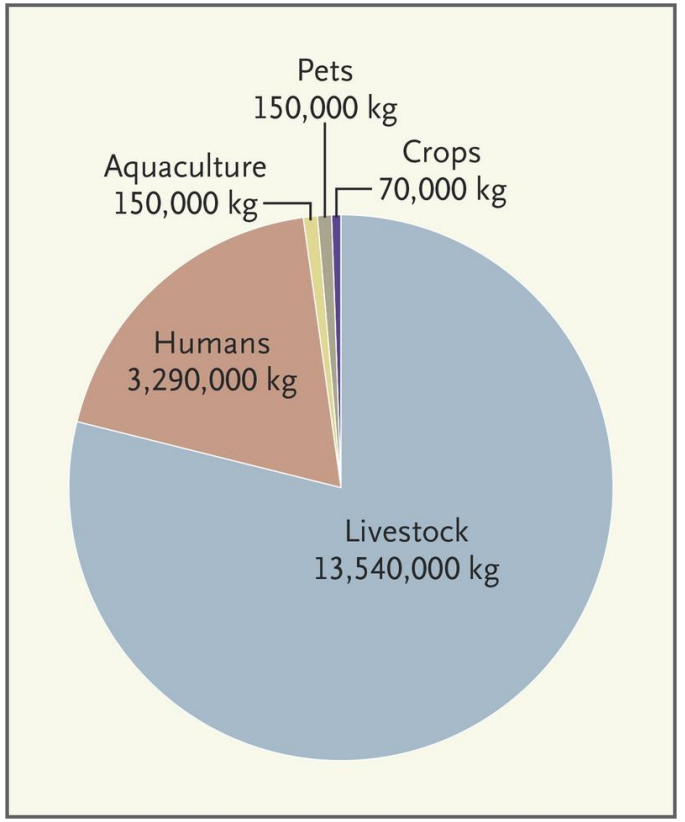
Goals for this Presentation

- Review antibiotic use in the United States.
- Summarize antimicrobial stewardship core elements for various segments of health care.
- Discuss patterns of outpatient antibiotic use and appropriateness of use.
- Discuss the value and limitation of various methods of assessing patterns of antibiotic use in the outpatient setting.

Food for Thought

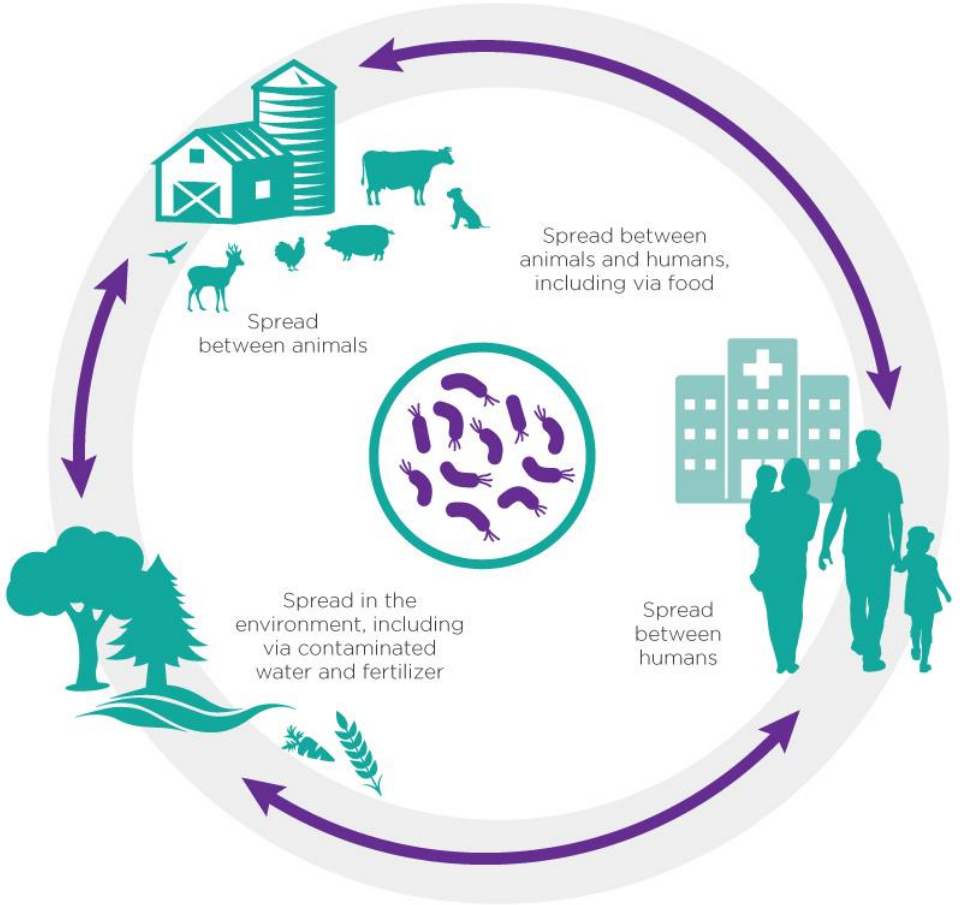
- **Where are antibiotics used in the United States?**
  - **There are not different classes of antibiotics used for human and non-human indications.**



Resistance Community

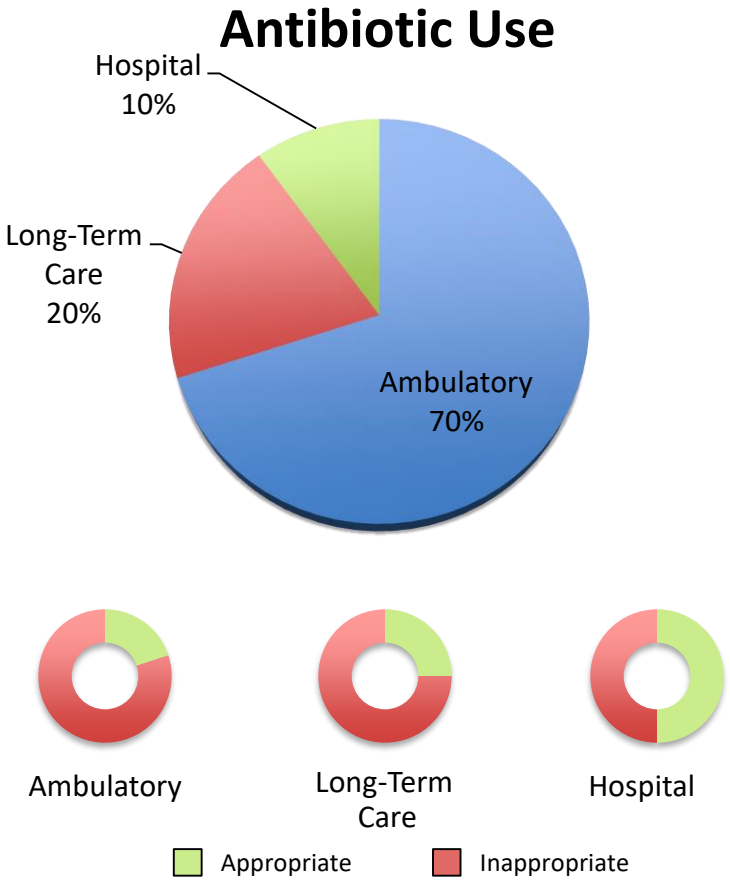
- **When it comes to antimicrobial selective pressure and emergence of resistance, we are all in this together.**

Effron Z, et al. Disney Channel 2006



Food for Thought

- **Of the antibiotics used in humans, which segment of the health care system uses the most antibiotics?**
  - **70% of antibiotics are used in the ambulatory care setting**
- **What percent of antibiotic use is inappropriate?**
  - **Most antibiotics that are used are either unnecessary or inappropriately prescribed.**



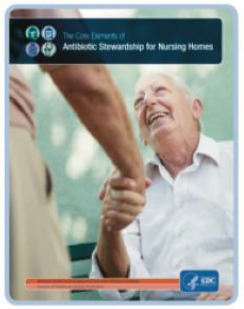
Antimicrobial Stewardship Call to Action

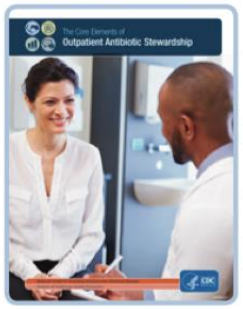
- **The White House recently published two documents that focus on combating antibiotic resistance.**
  - **September 2014 "National Strategy for Combating Antibiotic-Resistant Bacteria"**
  - **March 2015 - "National Action Plan for Combating Antibiotic-Resistant Bacteria"**

https://www.whitehouse.gov/sites/default/files/docs/carb_national_strategy.pdf
https://www.whitehouse.gov/sites/default/files/docs/national_action_plan_for_combating_antibotic-resistant_bacteria.pdf

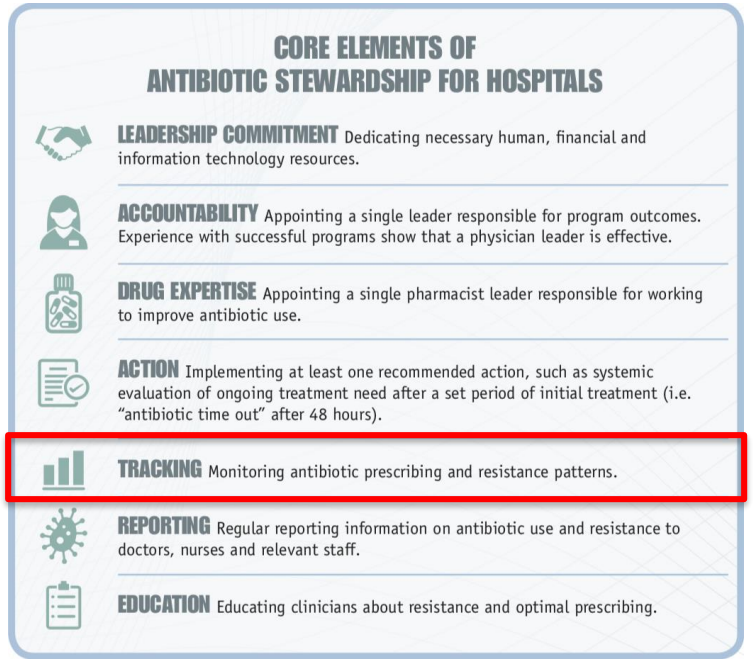
Call to Action

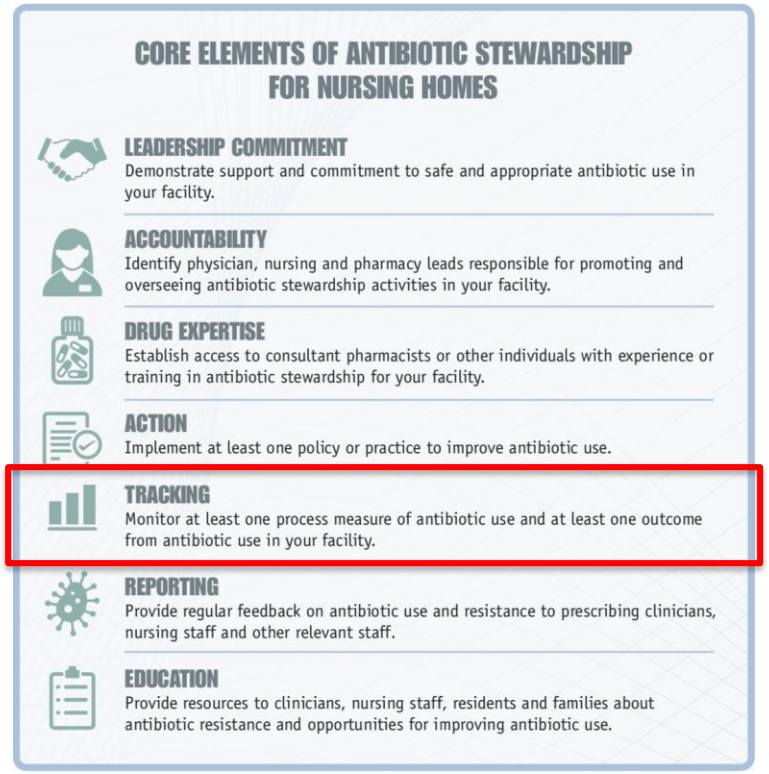
- **CDC has published the Core Elements series to provide guidance for engaging in antimicrobial stewardship in hospitals, nursing homes, and outpatient settings.**

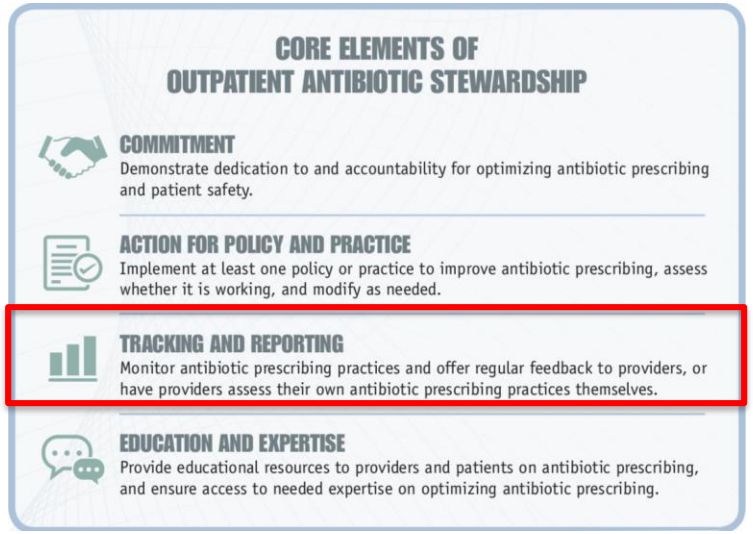




Core Elements







Tracking Antibiotic Use

Hospital

- **Defined Daily Doses (DDD)**
  - Total number of grams of each antibiotic purchased, dispensed, or administered during a period of interest divided by the World Health Organization-assigned DDD.
- **Days on Therapy (DOT)**
  - Aggregate sum of days for which any amount of antibiotic is administered or dispensed divided by a standardized denominator (e.g., patient days, admissions).

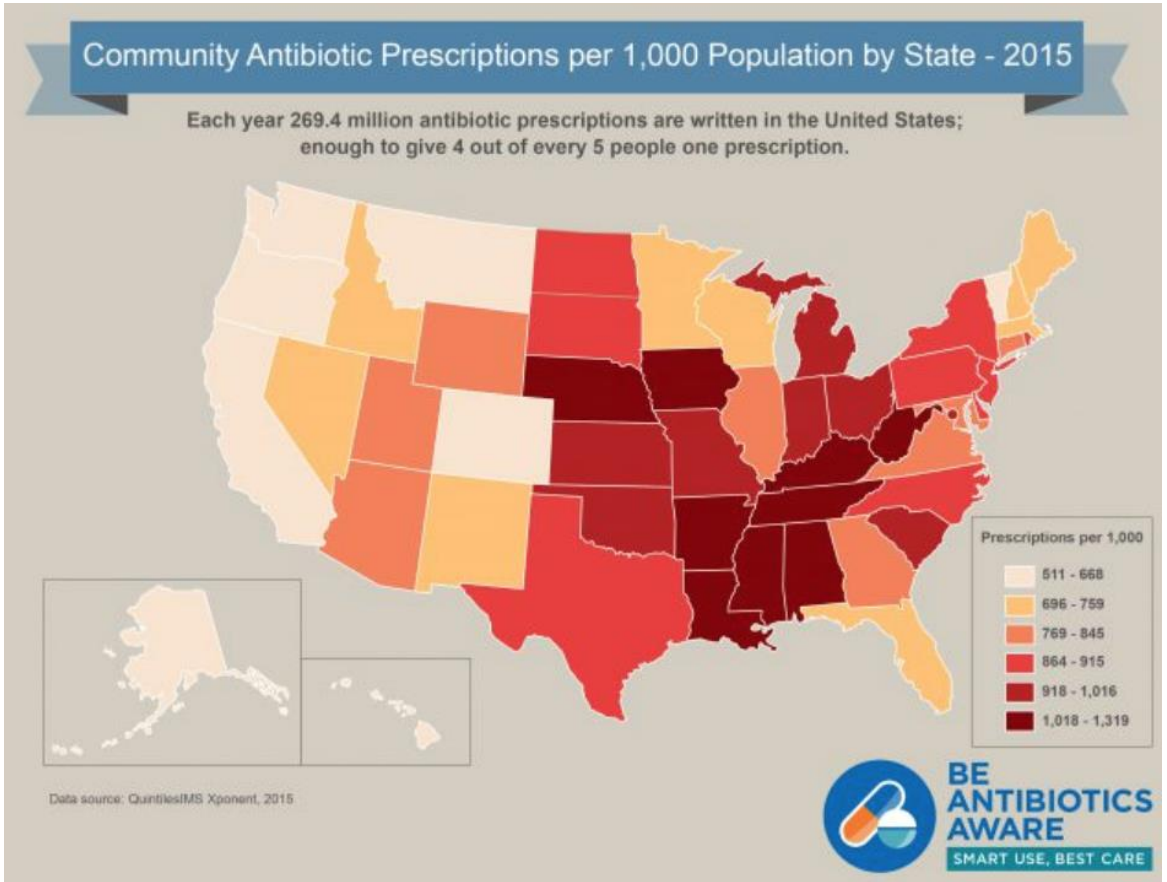
Nursing Home

- **Point prevalence of antibiotic use**
  - Track the proportion of residents receiving antibiotics during a given time period (i.e., a single-day, a week, or a month).
- **Antibiotic Starts**
  - Number of new antibiotic prescriptions/total number of resident-days X 1,000
- **Days on Therapy (DOT)**

Outpatient Antibiotic Use

- **In 2015 the national rate of antibiotic prescribing was 838 antibiotic prescriptions per 1,000 persons.**

There is currently no standardized method for assessing and reporting outpatient antibiotic use.



LA Hicks, et al. NEJM 2013

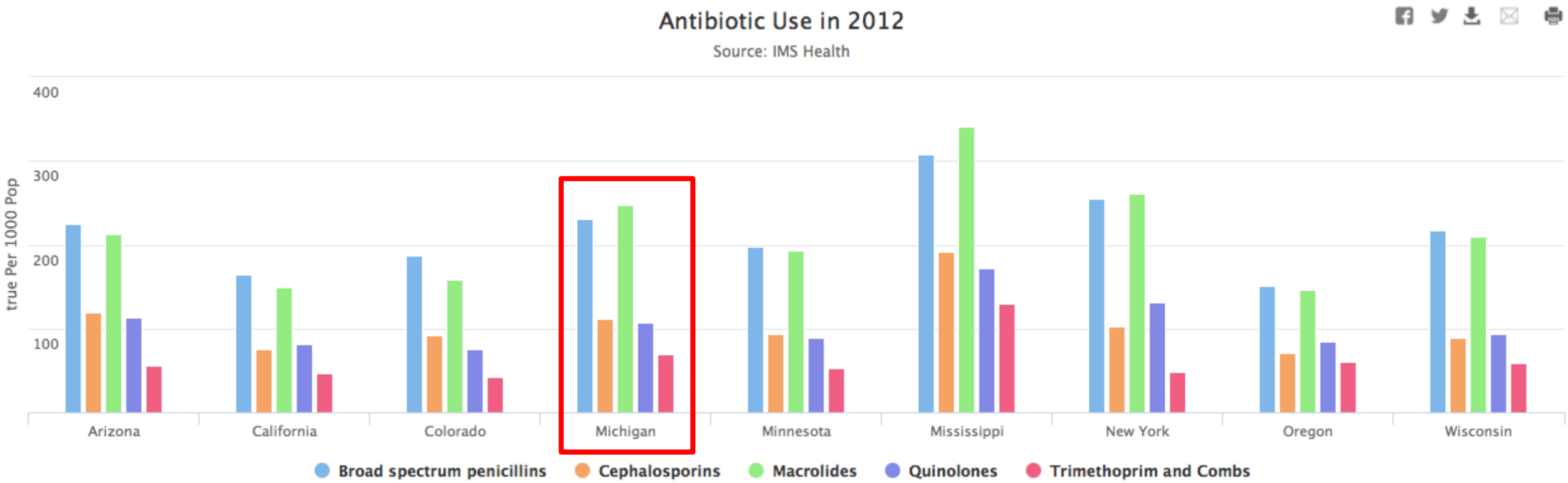
https://www.cdc.gov/antibiotic-use/community/programs-measurement/state-local-activities/outpatient-antibiotic-prescriptions-US-2015.html

Outpatient Antibiotic Use

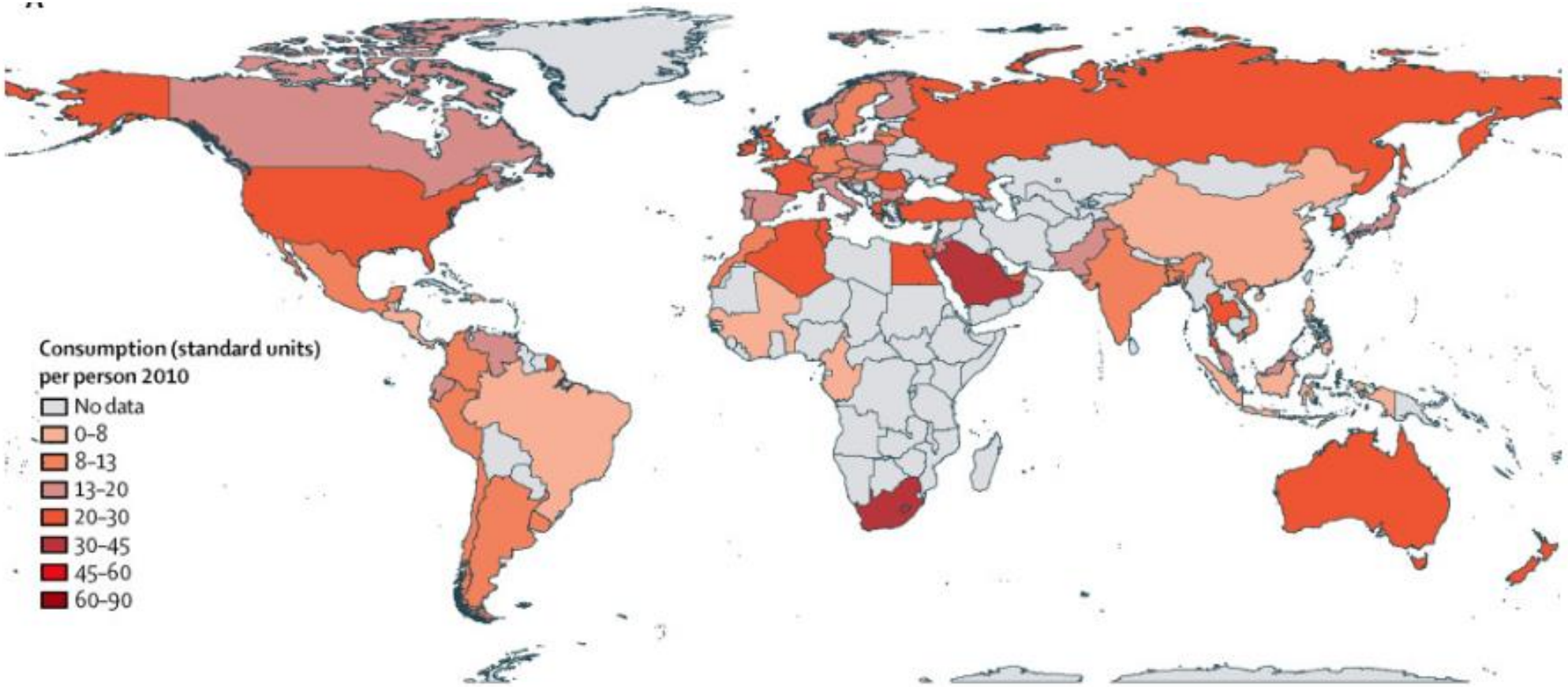
- **ResistanceMap**
  - **An interactive collection of charts and maps that summarize national and subnational data on antimicrobial use and resistance worldwide.**
  - **Published by Center for Disease Dynamics, Economics & Policy (https://resistancemap.cddep.org/index.php).**

https://resistancemap.cddep.org/index.php

Outpatient Antibiotic Use



Antibiotic Use



TP VanBoekel, et al, The Lancet ID. 2014; 14:742-50.

Antibiotic Use

- **Rates of antibiotic consumption per person were higher in the United States than for most European countries.**
- **Differences might relate to differences in treatment guidelines, marketing strategies, and structural differences in health-care systems.**
- ***Concluded that no disincentives exist for prescription of outpatient antibiotic drugs in the United States.***

TP VanBoekel, et al, The Lancet ID. 2014; 14:742-50.

Outpatient Antibiotic Use in 2015

Which antibiotics do you think are most commonly prescribed?

Outpatient Antibiotic Use in 2015

Antibiotic Agent	Number of Antibiotic Prescriptions (Millions)	Antibiotic Prescriptions per 1,000 Persons
Amoxicillin	54.8	171
Azithromycin	46.2	144
Amoxicillin/Clavulanate	25.3	79
Cephalexin	21.4	67
Ciprofloxacin	20.3	63

https://www.cdc.gov/antibiotic-use/community/programs-measurement/state-local-activities/outpatient-antibiotic-prescriptions-US-2015.html

Outpatient Antibiotic Use in 2015

Who is prescribing antibiotics?

Outpatient Antibiotic Use in 2015

Provider Specialty	Number of Antibiotic Prescriptions (Millions)	Antibiotic Prescriptions per 1,000 Persons
Primary Care Physicians	110.8	466
PA's and NP's	62.9	363
Surgical Specialties	19.5	219
Dentistry	25.1	205
Emergency Medicine	14.8	457
Dermatology	7.1	628
Obstetrics/Gynecology	6.3	167
Other	22.9	295

https://www.cdc.gov/antibiotic-use/community/programs-measurement/state-local-activities/outpatient-antibiotic-prescriptions-US-2015.html

Outpatient Antibiotic Use

- **Using 2010-11 National Ambulatory Medical Care Survey (NAMCS) and National Hospital Ambulatory Medical Care Survey (NHAMCS) data the rates of outpatient oral antibiotic prescribing and the proportion that may be inappropriate were estimated.**
  - **The mean annual rate per 1,000 census population, number and, percentage of visits resulting in an antibiotic prescribed were *estimated*.**

Fleming-Dutra et al. *JAMA*. 2016;315:1864-73.

Outpatient Antibiotic Use

- **Appropriateness of use was based on review of national guidelines for specific indications:**
  - **Pharyngitis**
  - **Asthma and allergy**
  - **Bronchitis/bronchiolitis**
  - **Influenza**
  - **Nonsuppurative otitis media**
  - **Viral upper respiratory tract infection**
  - **Pneumonia**
  - **Urinary tract infections**

Fleming-Dutra et al. *JAMA*. 2016;315:1864-73.

Outpatient Antibiotic Use

Diagnosis	Visits with Antibiotics Prescribed by Age group (% appropriate)		
	0-19 years	20-64 years	≥65 years
Sinusitis	84.7% **(90%)**	70.9% **(49%)**	53.8% **(84%)**
Pharyngitis	56.2% **(67%)**	72.4% **(24%)**	---
Viral URI	21.2% **(0%)**	43.0% **(0%)**	39.4% **(0%)**
Bronchitis/bronchiolitis	55.2% **(0%)**	72.4% **(0%)**	60.9% **(0%)**

- **Among all patients, 50% of the antibiotic prescriptions for respiratory conditions were not warranted. For all conditions, 30% of antibiotic prescriptions were not warranted.**

Fleming-Dutra et al. *JAMA*. 2016;315:1864-73.

Outpatient Antibiotic Use

- **Authors concluded:**
  - **A substantial amount of antibiotic overuse is driven by over diagnosis and not adhering to established criteria for making a diagnosis.**
  - **Nationally, a 30% reduction in overall antibiotic use is achievable.**
  - **The more times a patient see a prescriber the more likely it is that the patient will get a prescription for an antibiotic.**

Fleming-Dutra et al. *JAMA*. 2016;315:1864-73.

Methods for Assessing Outpatient Antibiotic Use

Data Source	Level of Data	Strengths	Weaknesses
Practice Surveys (NAMCS, NHAMCS)*	Population	• Good for examining national/regional trends	• Not useful to direct stewardship • Costly to acquire • Time lag • Cumbersome to analyze
Claims Data	Population		
Purchase Data from pharmacy wholesalers	Population		
Electronic Medical Records Data	Patient/Prescriber	• Short time lag • Good for examining individual prescribing patterns • Patient level data	• Burden of extraction on the individual site.
Prescriptions filled	Patient	• Accurate assessment of use	• Difficult to obtain

*National Ambulatory Medical Care Survey (NAMCS) and National Hospital Ambulatory Medical Care Survey (NHAMCS)

Quantifying and Assessing Outpatient Antibiotic Use

- **Process**
  1. **Identify episodes of antibiotic use**
  2. **Collect patient information**
     - **Laboratory data, ICD codes, Allergies**
  3. **Collect prescription data**
  4. **Compare prescribed regimen with recommended regimen**

Klepser ME, et. al., Innovations in Pharmacy. 2016;7:1-8.
Klepser ME, et al. A Call to Action for Outpatient Antibiotic Stewardship. *JAPhA*. 2017;57:457-63.

Quantifying and Assessing Outpatient Antibiotic Use

- **Definitions**
  - **Prescribed Therapeutic Regimen (PTR)**

    PTR = Antibiotic dose x Frequency x Duration
  - **Recommended Therapeutic Regimen (RTR)**
    - **RTR calculations based on regimens recommended in guidelines**
    - **RTR ranges were calculated**
    - **RTR parameters determined for various renal function, weight, etc.**

Klepser ME, et. al., Innovations in Pharmacy. 2016;7:1-8.
Klepser ME, et al. A Call to Action for Outpatient Antibiotic Stewardship. *JAPhA*. 2017;57:457-63.

Sample RTRs

Recommended antimicrobials and doses for adults with streptococcal pharyngitis (CID 2012)			
Antibiotic	**Daily Dose Range**	**Duration (days)**	**RTR Range**
Amoxicillin	1,000	10	10,000
Penicillin V	1,000-2,000	10	10,000-20,000
Benzathine Penicillin G	1,200,000	1	1,200,000
Cephalexin	1,000	10	10,000
Cefdroxil	1,000	10	10,000
Clindamycin	900	10	9,000
Azithromycin	500 then 250	5	1,500
Clarithromycin	500	10	5,000

Quantifying and Assessing Outpatient Antibiotic Use

- **Data were collected from the EMR of the WMed clinics between January 1, 2012-August 31, 2014.**
  - **8,329 patients were seen in the clinic during this time.**
  - **2.6% of patients received a prescription for an antibiotic.**
  - **Rates of antibiotic prescribing:**
    - **380 (95% CI: 370, 391) antibiotics per 1,000 *clinic patients***
    - **55.5 (95% CI: 53, 57) antibiotics per 1,000 *clinic visits***

Klepser ME, et. al. *ACCP Annual Meeting* 2017.

Quantifying and Assessing Outpatient Antibiotic Use

Diagnosis	Antibiotic Use (%)	Percent Non-concordant antibiotic (95% CI)	Percent Non-concordant dosing regimen (95% CI)
UTI	13.3%	20.3% (16.4%, 24.5%)	37.0% (31.0%, 43.4%)
Cellulitis	9.9%	12.6% (9.1%, 16.9%)	26.5% (20.3%, 33.6%)
Streptococcal pharyngitis	8.1%	14.1% (10.1%, 18.9%)	65.7% (58.1%, 72.8%)
Sinusitis	8.0%	71.5% (65.6%, 77.0%)	33.9% (22.6%, 46.7%)
Overall		**26.5% (24.2%, 27.9%)**	**47.9% (44.3%, 51.5%)**

Klepser ME, et. al. *ACCP Annual Meeting* 2017.

Value of Collecting Antibiotic Prescribing Data

- Establish baseline and ongoing metrics to assess use and measure impact of interventions.
- Estimate per-patient antibiotic prescribing rates and guideline adherence rates.
  - Compare with national, state, local, clinic, and prescriber data
- Generate usage reports by indication, clinic, and/or prescriber.
- Identify areas for intervention

Principles of Outpatient Antimicrobial Stewardship

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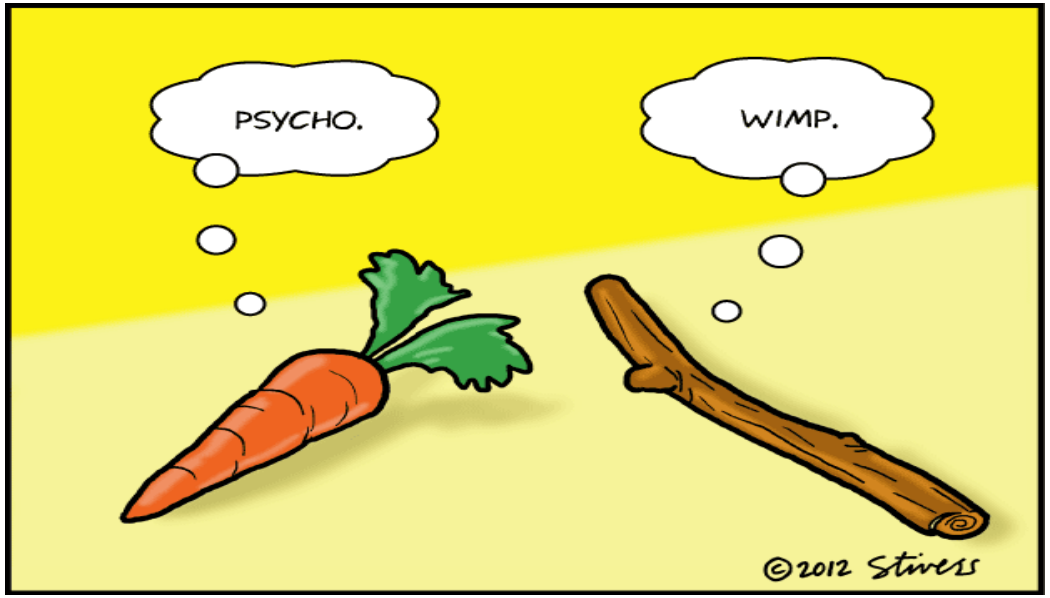
Antibiotic Use and Patient Outcomes

- **Data suggest that antibiotic prescribing for a number of diagnoses can be safely decreased.**
  - **From 2000-05 antibiotic use for otitis media in Sweden decreased by 50% with no increase in mastoiditis.**
  - **In 2014, Sweden dispensed 328 antibiotic courses per 1,000 population compared to 877 per 1,000 population in the United States.**

Antimicrobial Stewardship

- **Why have efforts to date focused almost exclusively on inpatient settings?**
  - **Trained personnel**
  - **Ability to track usage and outcomes**
  - **Carrots and sticks**



Ambulatory Care Accreditation and Stewardship

- **JACHO is currently developing an antimicrobial stewardship standard for ambulatory care and office-based surgery practices.**
- **As of 2016, the Accreditation Association for Ambulatory Health Care (AAAHC) requires accredited organizations to complete a written infection prevention risk assessment.**
    - **Likely to expand stewardship**

Joint Commission Perspectives. July 2016;36:1-8.

Steps for Establishing an Outpatient Antimicrobial Stewardship Program

- Identify program scope
- Create Stewardship Team
- Assess baseline practice and antibiotic use
- Develop program priorities
- Develop initiatives
- Develop and monitor progress and outcomes

Klepser ME et al. *JAPhA*. 2017;57:457-63.
Klepser ME, et. al. Community-based antimicrobial stewardship. In: Ambulatory Care Pharmacy Self-Assessment Program, American College of Clinical Pharmacy, 2016:53-70.

Identify the Scope of the Program

- Single institution vs. community wide
- Identify stakeholders
- Identify a point person within each organization
- Develop a data dissemination plan among partners

Klepser ME et al. *JAPhA*. 2017;57:457-63.

Create an Antimicrobial Stewardship Team

- **Identify core and translational members**
  - **View as an extension of inpatient stewardship activities. Leaders from the inpatient team can lead outpatient activities.**
  - **Identify roles**
  - **Secure document to support members engagement in antimicrobial stewardship activities**

Klepser ME et al. *JAPhA*. 2017;57:457-63.

Key Members of an Outpatient Antimicrobial Stewardship Team

Core Members

- Physician
  - Training in ID preferred, but not essential.
- Pharmacist
  - Training in ID preferred, but not essential.

Translational Members

- Clinic leader
- Microbiologist/Laboratorian
  - Track pathogens and susceptibility patterns
  - Develop recommendations for use of POCT
- Public Health
- Information Technology Specialist

Klepser ME, et al.. *JAPhA*. 2017;57:457-63.

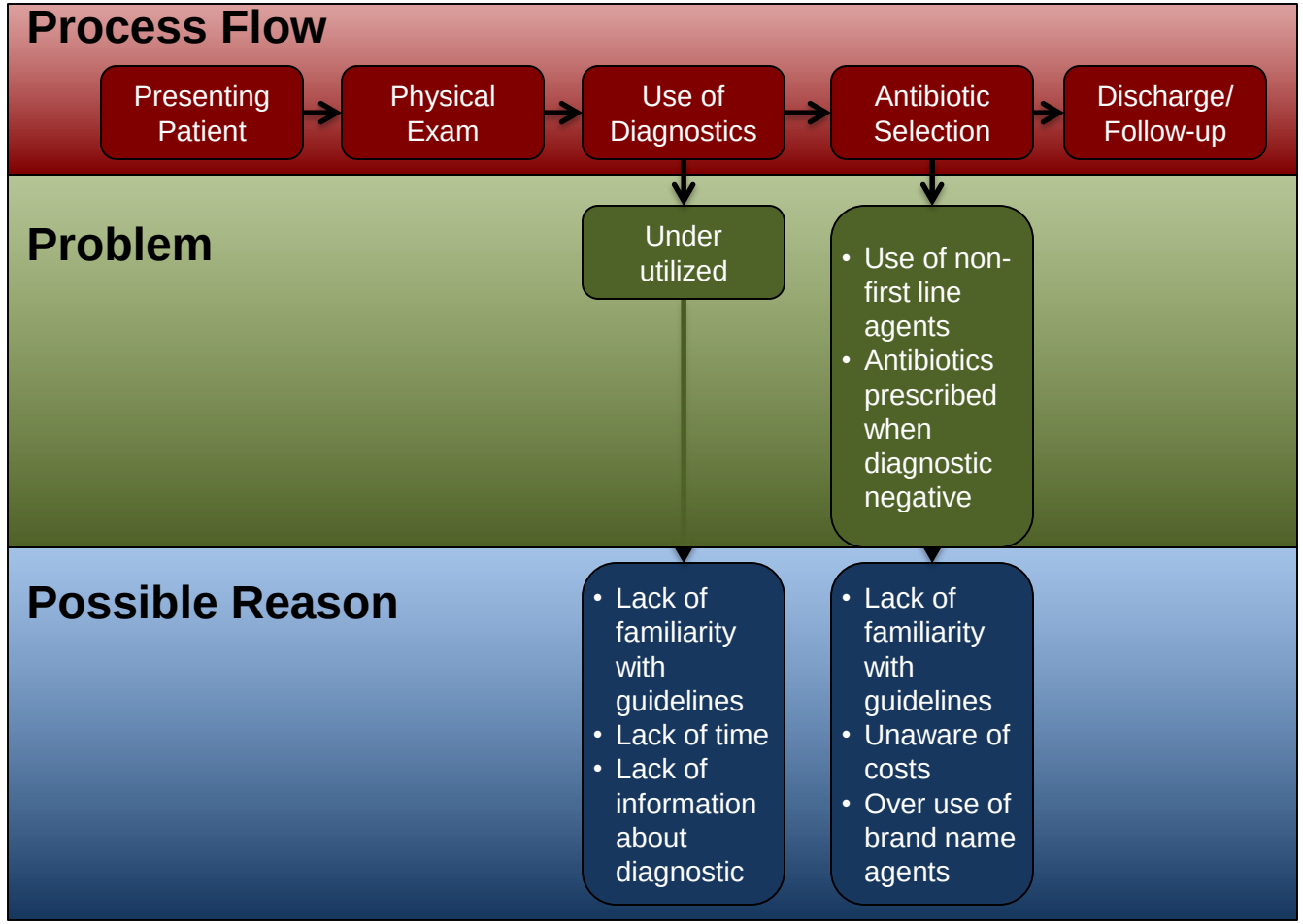
Assess Baseline Antibiotic Use, Resistance Patterns, and Outcomes

- Report usage data to the prescriber/patient level
- Compare usage patterns to available metrics
  - Among prescribers and clinics
- Create local outpatient antibiogram
- Summarize outpatient infection control measures and immunization rates
- Summarize antibiotic complication rates
  - Readmissions, CDI rates, adverse reactions, secondary infections

Klepser ME et al. *JAPhA*. 2017;57:457-63.

Develop Program Priorities

- Identify areas of concern
- Create a process map of elements that contribute to the problem
- List primary and secondary desired outcomes for each area of concern
  - Antibiotic prescription rates, cost, resistance rates, rates of hospitalization



Develop Initiatives to Address Problems

- List interventions that would likely improve outcome
- For each intervention, develop a process or workflow describing the intervention and individuals involved
- Establish a timeline for implementation and assessment of outcomes
  - This is essential to make sure everyone has the same expectations
- Seek approvals if necessary

Klepser ME et al. *JAPhA*. 2017;57:457-63.

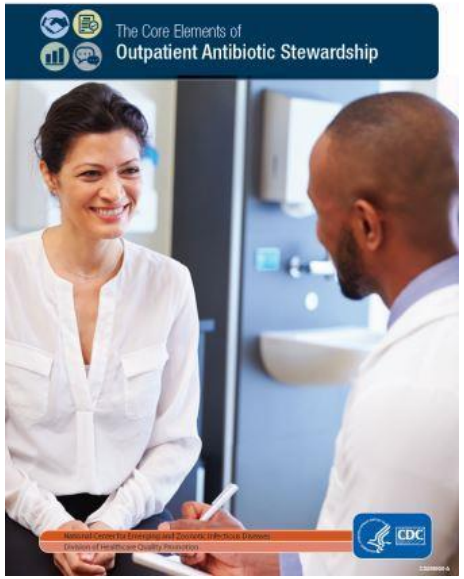
Develop Procedure to Monitor Progress and Outcomes

- Assess the impact of each intervention on the desired outcomes
- Track continued feasibility of each intervention
- Determine if interventions and outcomes yielded the desired impact on the area of concern
- Refine initiatives as needed

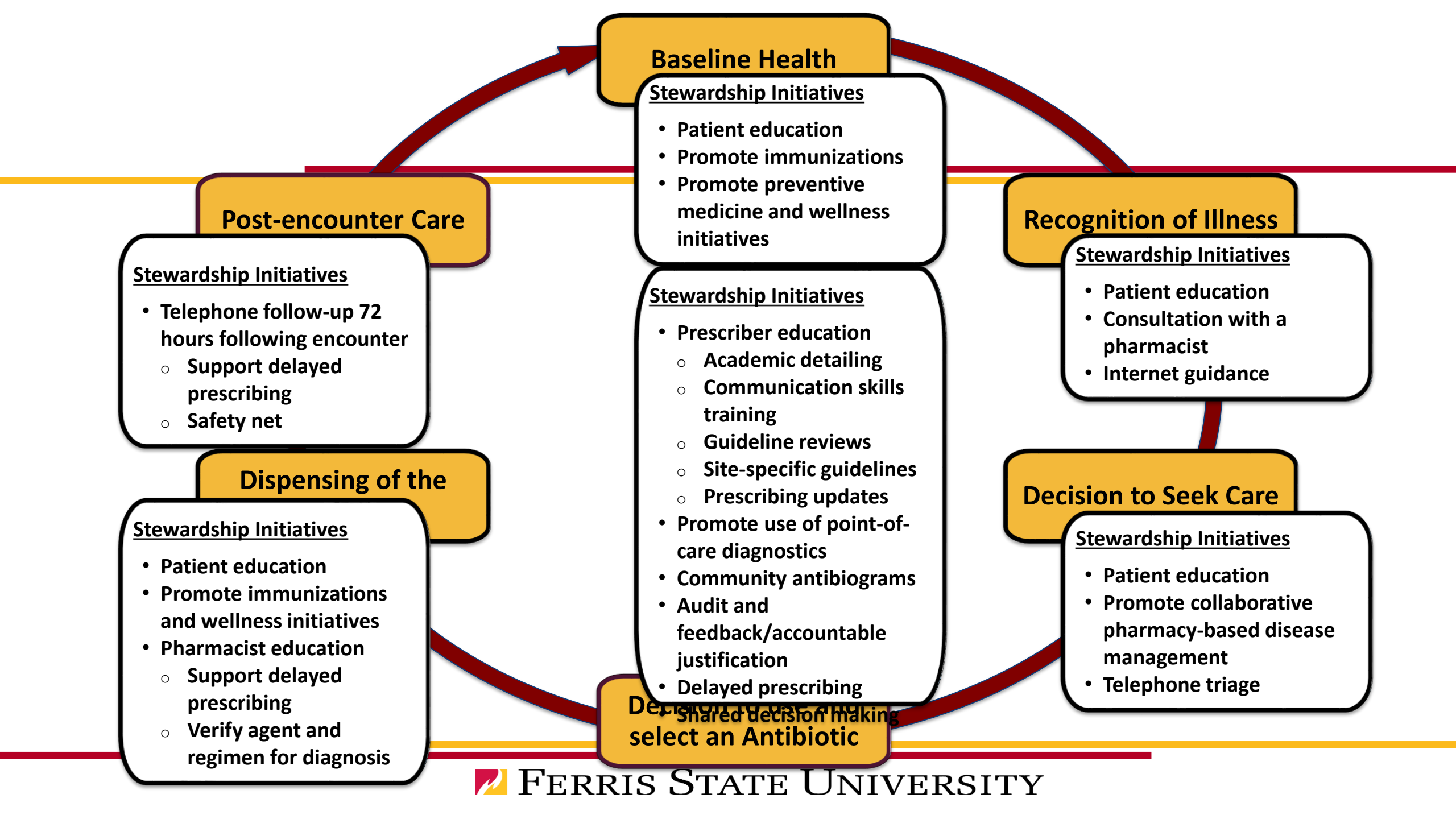
Klepser ME et al. *JAPhA*. 2017;57:457-63.

Outpatient Antimicrobial Stewardship Initiatives

- **Data supporting various initiatives have been summarized**
- **Think broader than the system or clinician to have maximal impact.**



https://www.cdc.gov/getsmart/community/pdfs/16_268900-a_coreelementsoutpatient_appendix_508.pdf


Baseline Health
Stewardship Initiatives
• Patient education
• Promote immunizations
• Promote preventive medicine and wellness initiatives
Recognition of Illness
Stewardship Initiatives
• Patient education
• Consultation with a pharmacist
• Internet guidance
Decision to Seek Care
Stewardship Initiatives
• Patient education
• Promote collaborative pharmacy-based disease management
• Telephone triage
Decision to Prescribe and select an Antibiotic
Stewardship Initiatives
• Prescriber education
○ Academic detailing
○ Communication skills training
○ Guideline reviews
○ Site-specific guidelines
○ Prescribing updates
• Promote use of point-of-care diagnostics
• Community antibiograms
• Audit and feedback/accountable justification
• Delayed prescribing
• Shared decision making
Dispensing of the
Stewardship Initiatives
• Patient education
• Promote immunizations and wellness initiatives
• Pharmacist education
○ Support delayed prescribing
○ Verify agent and regimen for diagnosis
Post-encounter Care
Stewardship Initiatives
• Telephone follow-up 72 hours following encounter
○ Support delayed prescribing
○ Safety net

Outpatient Antimicrobial Stewardship

- **Evidence supporting outpatient stewardship**
  - **Multifaceted interventions are most effective.**
  - **No single intervention is recommended for all settings.**
  - **Improved antibiotic prescribing can be achieved without affecting patient outcomes.**
  - **Active clinician education is less effective that other interventions.**

https://www.cdc.gov/getsmart/community/pdfs/16_268900-a_coreelementsoutpatient_appendix_508.pdf

CDC Core Elements for Outpatient Stewardship

- **Core Elements of Outpatient Antibiotic Stewardship**
  1. ***Commitment*: Demonstrate dedication to and accountability for optimizing antibiotic use and patient safety**
  2. ***Action*: Implement at least one policy or practice to improve antibiotic use, assess whether it is working, and modify as needed**
  3. ***Tracking and reporting*: Monitor antibiotic prescribing practices and offer regular feedback to clinicians or perform self-assessment on antibiotic use**
  4. ***Education and expertise*: Provide educational resources to clinicians and patients on antibiotic use and ensure access to needed expertise on judicious antibiotic prescribing**

http://www.cdc.gov/getsmart/community/pdfs/16_268900-a_coreelementsoutpatient_508.pdf

Outpatient Antimicrobial Stewardship

- **Commitment**
  - **Support from leadership is essential**
  - **Public commitment (e.g., poster) can reduce inappropriate prescribing**

https://www.cdc.gov/getsmart/community/pdfs/16_268900-a_coreelementsoutpatient_appendix_508.pdf

Outpatient Antimicrobial Stewardship

- **Action**
  - **Delayed prescribing and watchful waiting decrease antibiotic use by about 40% without affecting patient satisfaction.**
    - **What do patients want out of an encounter?**
    - **Partner with pharmacists to help patients identify when a prescription should be filled.**
    - **Underutilized among adults.**
  - **Communication skills training**
    - **Improved communication with patients results in decreased antibiotic prescribing.**

https://www.cdc.gov/getsmart/community/pdfs/16_268900-a_coreelementsoutpatient_appendix_508.pdf

Outpatient Antimicrobial Stewardship

- **Action**
  - **Explicit justification for non-recommended antibiotic prescribing reduces antibiotic prescribing by ~20%.**
  - **Peer comparison of antibiotic prescribing decreases prescribing by ~6%.**
  - **Clinical decision support, electronic or print, improve prescribing in the short term but not the long term.**
  - **Call centers, nurse hotlines, or pharmacist consultations can effectively manage roughly 80% of encounters without need for an antibiotic.**

https://www.cdc.gov/getsmart/community/pdfs/16_268900-a_coreelementsoutpatient_appendix_508.pdf

Outpatient Antimicrobial Stewardship

- **Tracking and Reporting**
  - **Audit and feedback with peer comparison and clinician education led to decreases in non-recommended antibiotic prescribing.**
    - **Effect waned if interventions were discontinued.**
    - **Reduction in antibiotic use was not associated with changes in return visits or hospital admissions.**
    - **Impact was greatest if feedback was provided by an important figure such as a medical director or residency director.**

https://www.cdc.gov/getsmart/community/pdfs/16_268900-a_coreelementsoutpatient_appendix_508.pdf

Outpatient Antimicrobial Stewardship

- **Education**
  - **Patient education of why antibiotics are not needed along with recommendations for treating symptoms decreased antibiotic prescribing and maintained patient visit satisfaction.**
    - **Patients want to have their concerns heard and feel better.**
  - **Prescriber education alone results in short term improvement.**

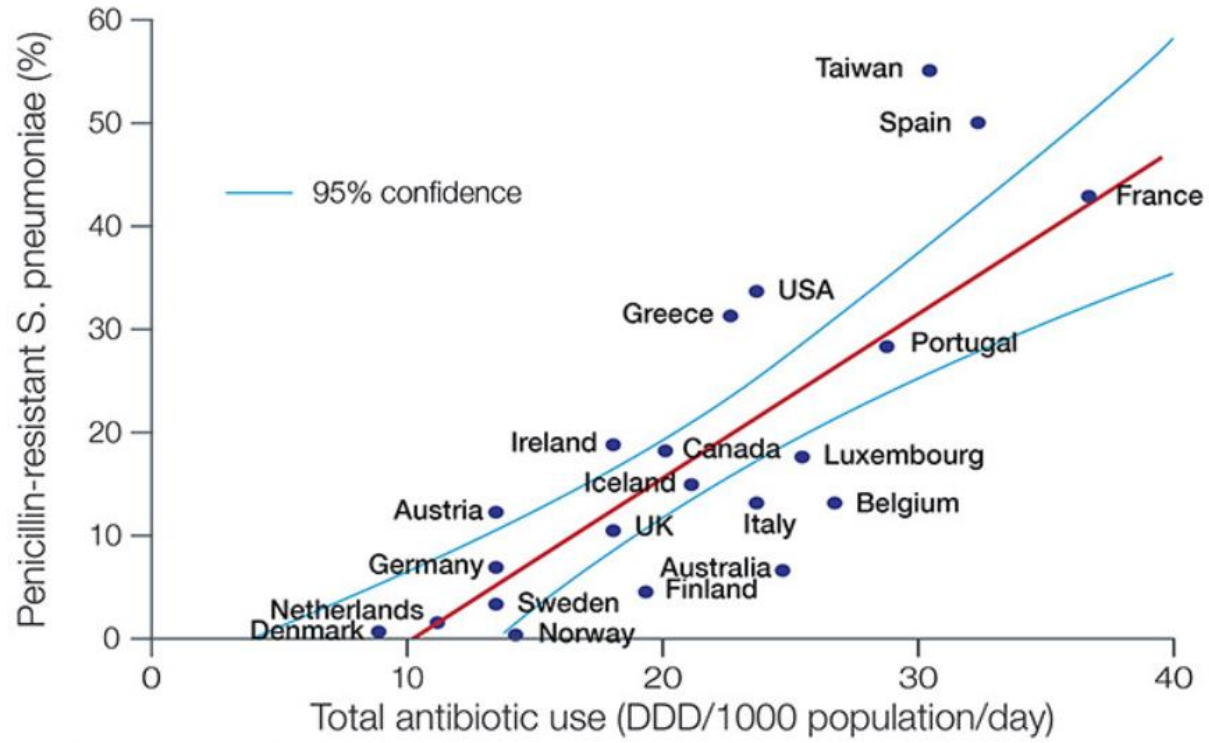
https://www.cdc.gov/getsmart/community/pdfs/16_268900-a_coreelementsoutpatient_appendix_508.pdf

Importance of Outpatient Antimicrobial Stewardship

- **Slow the emergence of resistant bacteria**
  - **Outpatient antibiotic use affects inpatient antibiotic use.**
  - **Infection related mortality with antibiotic resistant bacteria will exceed cancer-related mortality by 2050.**
  - **Cost the US health system more than $20 billion annually.**
- **Reduce adverse reactions**
- **Decrease *C. difficile* infections**
- **Decrease health care costs**

Antibiotic Use and Resistance

- Numerous studies have correlated antibiotic consumption with emergence of resistance.
- Resistance has been linked with:
  - Increased infection-related mortality
  - Increased cost ($20 billion excess treatment costs)

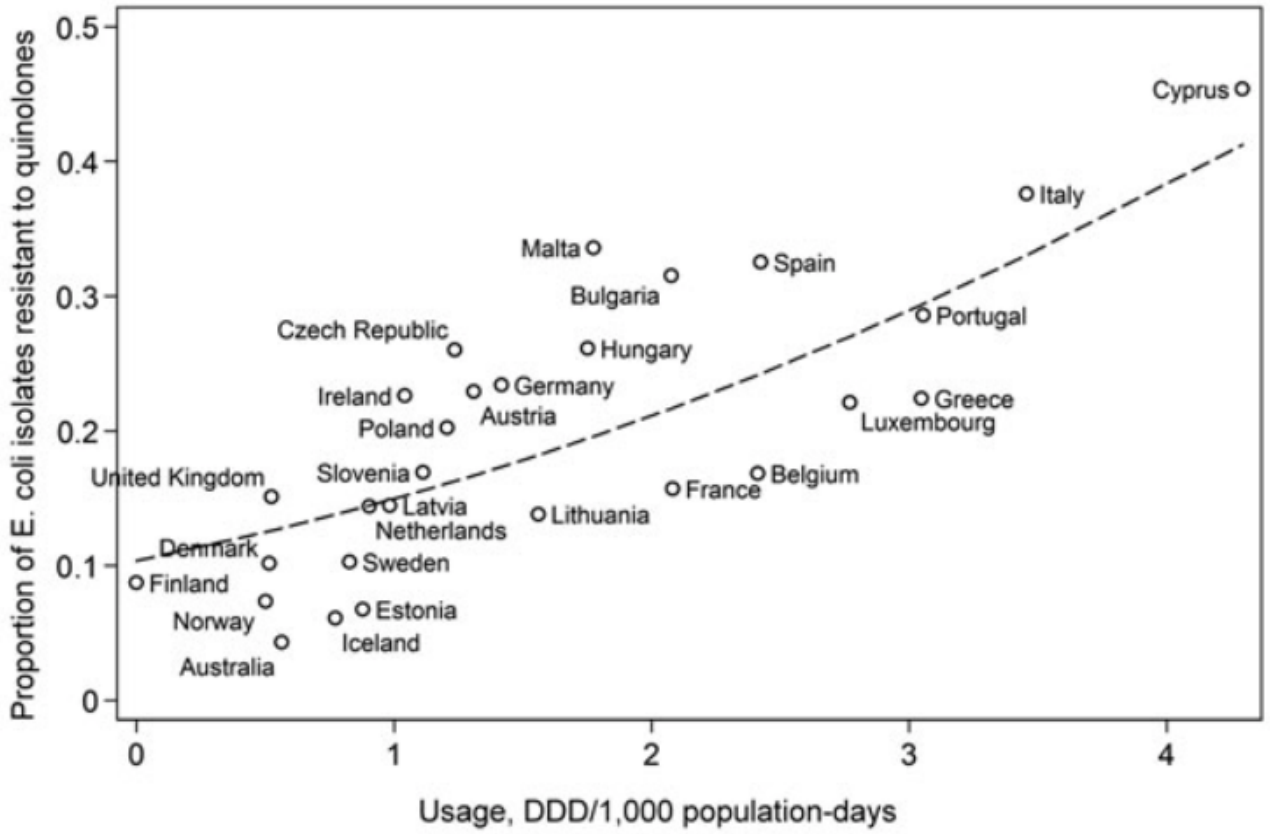


Source: WHO data 2000-2003

H Goossens, et al. Lancet. 2005;365:579-87.

Antibiotic Use and Resistance

- **Fluoroquinlone use and resistance among *E. coli.***



AC Cheng, et al. Emerg Infect Dis. 2012;18.

Antibiotic Use and Resistance

- **Decreasing use of antibiotics can decrease antimicrobial resistance.**

Number of days of β-lactam use in past 6 months	Recovery of a Resistant Isolate Odd Ratio (95% CI)	P value
0		
1-7	0.86 (0.37, 2.02)	0.73
8-14	1.5 (0.73, 3.06)	0.27
>14	2.5 (1.3, 4.82)	0.006

Nasrin et al. *BMJ*. 2002;324:1-4.

Impact of Outpatient Antibiotic Use

- **Adverse effects associated with antibiotics are the most common drug-related causes for emergency department visits among individuals less than 18 years of age.**
  - **Responsible for one out of every five drug-related emergency department visits for all patients.**

Antibiotic resistance threats in the United States, 2013, Center for Disease Control and Prevention
Shehab et al. *JAMA*. 2016;316:2115-25

Summary

- **Curbing inappropriate outpatient antibiotic use is a world-wide effort.**
- **Strategies to improve outpatient antibiotic use are multifaceted and multidisciplinary.**
- **Effective stewardship outpatient involves thinking beyond the patient in front of you.**

Scenario

- **Wolverine is a local health system that operates a hospital and two freestanding outpatient clinics.**

Demographic	Maize Clinic	Blue Clinic
Number of patients	6,142	18,765
Number of patient visits per year	10,734	53,353
Payor mix	80% private 20% Medicaid/Medicare	10% Private 90% Medicaid/Medicare
Prescribers	9 – Attending 20 - Residents	18 – Physicians 30 – PA's
Teaching Center	Yes	No
Number of pharmacists in clinic	2	0
Onsite laboratory	Yes	Yes

Scenario

- **Information about Wolverine Health Systems.**

Characteristic	Wolverine Health Systems
Inpatient beds	580
Outpatient Pharmacies Owned	3
Urgent Care Sites	2

- **Wolverine has a successful in inpatient antimicrobial stewardship program with 3 dedicated ID-trained pharmacists and an ID-trained physician.**

Scenario

- **You have been given the task of developing an outpatient antimicrobial stewardship program for the clinics.**

1. Identify the Program Scope

- System or community?
- Who are potential collaborating entities?
- What type of individual would you want as a point person at each entity?
- How will information be disseminated among collaborators?

2. Create an Antimicrobial Stewardship Team

- Identify core members and roles.
- Identify transitional members and roles.
- Will the members be the same at each clinic?

3. Assess Baseline Practice and Antibiotic Resistance Patterns

- **Are susceptibility data available for outpatient isolates?**
  - **Minimal from clinic: Urine isolates of *E. coli***
  - **Where else could we look for data?**
- **What baseline data would you like?**
  - **Antibiotic prescribing data (i.e., diagnoses, antibiotics, use of diagnostics, prescriber).**
  - **Immunization data.**

3. Assess Baseline Practice and Antibiotic Resistance Patterns

Item	Maize Clinic	Blue Clinic
Number of patients seen in the clinic	6,142	18,765
Number of visits per year resulting in a prescription	10,734	53,353
Number of prescriptions	21,467	64,020
Number of oral antibiotic prescriptions	2,576	16,005
Number of visits that resulted in at least one antibiotic prescription	1,932	13,338
Top diagnoses resulting in an antibiotic prescription	1. Other (53%) 2. UTI (18%) 3. Sinusitis (8%) 4. Acute pharyngitis (5%)	1. Other (45%) 2. Upper respiratory tract infection (21%) 3. UTI (5%) 4. Acute pharyngitis (5%)
Number of antibiotic prescriptions by provider type	9 – Attending: 257 20 – Residents: 2,319	18 – Physicians: 4,001 30 – PA's: 12,004

3. Assess Baseline Practice and Antibiotic Resistance Patterns

Item	Maize Clinic	Blue Clinic
Number of patients seen in the clinic	6,142	18,765
Number of visits per year resulting in a prescription **(Visits per patient)**	10,734 **(1.75 visits per patient)**	53,353 **(2.84 visits per patient)**
Number of prescriptions	21,467	64,020
Number of oral antibiotic prescriptions (%)	2,576 **(12%)**	16,005 **(25%)**
Number of visits that resulted in at least one antibiotic prescription (%)	1,932 **(18%)**	13,338 **(25%)**
Antibiotic prescriptions per 1,000 visits	(2,576/10,734)x1000 = **240 per 1,000 visits**	(16,005/53,353)x1000 = **300 per 1,000 visits**
Antibiotic prescriptions per 1,000 patients	(2,576/6,142)x1000 = **419 per 1,000 patients**	(16,005/18,765)x1000 = **881 per 1,000 patients**

3. Assess Baseline Practice and Antibiotic Resistance Patterns

Diagnosis	Maize Clinic			Blue Clinic		
	% Wrong Drug	% Wrong Dose	% Either	% Wrong Drug	% Wrong Dose	% Either
UTI	46%	45%	73%	53%	93%	97%
Sinusitis	70%	5%	70%	54%	30%	63%
Acute pharyngitis	25%	50%	64%	31%	33%	50%
URI (e.g., bronchitis, cold)	100%	---	---	100%	---	---

Appropriateness of agent and dosing regimen determined by examining treatment guidelines from the IDSA.

3. Assess Baseline Practice and Antibiotic Resistance Patterns

Diagnosis	Antibiotic	Maize Clinic		Blue Clinic	
		Frequency Prescribed	% Wrong Dose (PTR≠RTR)	Frequency Prescribed	% Wrong Dose
UTI			45%		93%
Uncomplicated cystits	Nitrofurantoin (100 mg Q12h x 5 days)	22.6%	48%	20.6%	100%
	TMP/SMX (1 DS Q12h x 3 days)	29.7%	34%	15.3%	92.9%
	Fosfomycin (3 g x 1 dose)	1.6%	0%	0.5%	0%
	Ciprofloxacin (250 mg Q12h x 3 days)	25.8%	91%	45.1%	66.7%
	Cephalexin (250 mg Q6h or 500 mg Q12h x 7-14 days)	19.2%	77.6%	11.6%	25%
	Amoxicillin (Not recommended)	1.3%	---	3.6%	---

Appropriateness of agent and dosing regimen determined by examining treatment guidelines from the IDSA.

1st Line agent; Not 1st Line agent

3. Assess Baseline Practice and Antibiotic Resistance Patterns

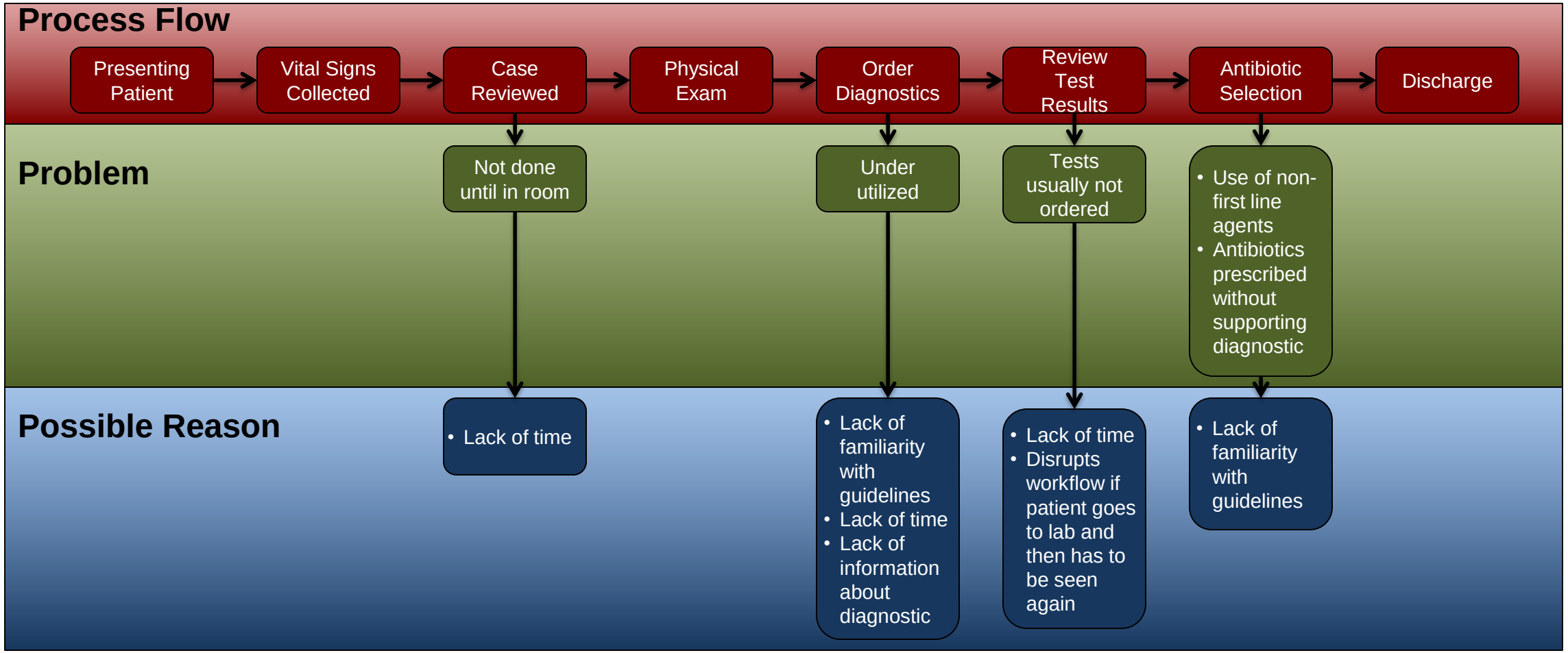
Diagnosis	Recommended Diagnostic Test	Maize Clinic	Blue Clinic
		Frequency that a recommended diagnostic tests was ordered	Frequency that a recommended diagnostic tests was ordered
UTI	Urinalysis	64%	53%
Sinusitis	None	---	---
Acute pharyngitis	Rapid Antigen Test	89%	31%
URI (e.g., bronchitis, cold)	None	---	---

Appropriateness of agent and dosing regimen determined by examining treatment guidelines from the IDSA.

4. Develop Antimicrobial Stewardship Priorities

- Antibiotic use is about twice as high (per 1,000 patients) in Blue clinic.
- Significant deviation from published guidelines at both clinics.
  - Roughly half of prescriptions for uncomplicated cystitis at both clinics are for non-1st line agents.
  - Even when a 1st line agent is prescribed for uncomplicated cystitis, the regimen is not supported by guidelines.
- Blue clinic underutilizes diagnostics.
- Vaccination rates for influenza and pnuemococcal vaccines are below Healthy People 2020 targets.

Process Map for Uncomplicated Cystits



4. Develop Antimicrobial Stewardship Priorities

Concern	Desired Outcomes	
	Maize Clinic	Blue Clinic
High antibiotic prescribing in Blue Clinic	• Describe OTHER	• Reduce prescribing for URI • Describe OTHER
High rate of non-adherence with guidelines	• Improve adherence with guidelines: >85% recommended agents and regimens	• Improve adherence with guidelines: >85% recommended agents and regimens
Underutilization of diagnostics	• Improve use of urinalysis for diagnosis UTI to 80%	• Improve use of urinalysis for diagnosis UTI to 80% • Improve use of RADT to >90%
Not meeting pnuemococal and influenza immunization targets	• Increase influenza immunization to 70% • Increase pneumococcal vaccination rate to 90% in patients>65 years	• Increase influenza immunization to 70% • Increase pneumococcal vaccination rate to 90% in patients>65 years

5. Develop Initiatives

Concern	Possible Interventions	
	Maize Clinic	Team Member Role
High antibiotic prescribing in Blue Clinic	• Public commitment to decrease antibiotic use	• Senior medical staff to develop letter to patients or a poster to display
High rate of non-adherence with guidelines	• Audit and feedback • Decision support tools • Prescriber education • Accountable justification	• Pharmacist with support of inpatient AST • Physicians, pharmacists, and IT with support of inpatient AST • Residency director to meet with residents • Residency director to meet with residents
Underutilization of diagnostics	• Audit and feedback • Prescriber education	• Physicians, pharmacists, and lab with support of inpatient AST
Not meeting pnuemococal and influenza immunization targets	• Patient education • Empower any clinical personnel to initiate immunization	• Pharmacists and nurses develop patient messaging • Physicians, pharmacists, and nurses discuss immunizations at each visit

6. Develop a Plan to Monitor the Process and Outcomes

- **Extract antibiotic use data on a quarterly basis to assess for impact and sustainability of interventions.**
- **Administer patient survey to determine if clinic staff are talking about immunizations.**

Parting Thoughts on Community Antimicrobial Stewardship

- Need partnerships across health care.
- Leadership likely to come from inpatient antimicrobial programs or public health.
- There is not a one size fits all solution.
- Need to think about illness as a cycle.